

We claim:

1        1. A bending press for bending metal plates in the  
2 production of pipe, comprising:

3              a press bed formed with a lower die against which a  
4 metal plate can be pressed to bend said plate;

5              a bending ram extending over the length of said lower  
6 die and formed with an upper die of downwardly convex shape  
7 engageable with said plate to press said plate against said lower  
8 die under said plate; and

9              an articulation for said upper die.

1        2. The bending press defined in claim 1 wherein said  
2 articulation for said upper die includes a pivot having a pivot  
3 axis extending parallel to said lower die between said upper die  
4 and a foot of said ram.

1        3. The bending press defined in claim 2 wherein said  
2 articulation includes a pivot for said ram at an upper end  
3 thereof having a pivot axis parallel to said die.

1        4. The bending press defined in claim 3 wherein said  
2 articulation forms a pivot axis for said upper die close to an  
3 upper surface of said plate.

1               5. The bending press defined in claim 4, further  
2 comprising at least one force-restoring member braced to bias  
3 said upper die back into an original position upon displacement  
4 of said upper die about said articulation.

1               6. The bending press defined in claim 5 wherein said  
2 upper die is articulated on said ram, said force-restoring member  
3 including a spring braced between said ram and said upper die.

1               7. The bending press defined in claim 5 wherein said  
2 ram is formed with said articulation at an upper end thereof and  
3 said force-restoring member is braced across said articulation.

1               8. The bending press defined in claim 5 wherein said  
2 force-restoring member includes a pair of springs.

1               9. The bending press defined in claim 1 wherein said  
2 ram comprises a generally upright plate of substantially uniform  
3 wall thickness over its height.

1               10. The bending press defined in claim 3 wherein said  
2 articulation includes a pivot for said ram at an upper end  
3 thereof having a pivot axis parallel to said die.

1               11. A method of bending a metal plate in the formation  
2     of large diameter pipe comprising the steps of repeatedly  
3     pressing a metal plate by an upper die at the bottom of a ram  
4     driven by a press head from above against a lower die on a press  
5     bed and in which the upper and lower die extend over the length  
6     of the plate to bend the plate;

7               repeating the bending step until a desired shape is  
8     imparted to said plate; and

9               articulating the upper die to enable it to adjust  
10    articulating to a contour of said plate during each bending  
11    thereof thereby limiting bending stress upon said ram.

1               12. A method of operating a bending press for the  
2     bending of steel plate for the production of large diameter pipe,  
3     which comprises the steps of:

4               placing a steel plate on a lower die on a bed of a  
5     bending press in which said lower die comprises a pair of  
6     supports enabling said plate to be bent between them;

7               pressing an upper die against said plate from above at  
8     the bottom of a sword-shaped ram driven by a head of the press  
9     downwardly to bend said plate; and

10              articulating said upper die during the bending of said  
11    plate so as to minimize a bending moment on said ram.